Silent Threats – Genetics and Iron

Hello

Lifecode GX ®
— Professional Genotype Analysis —

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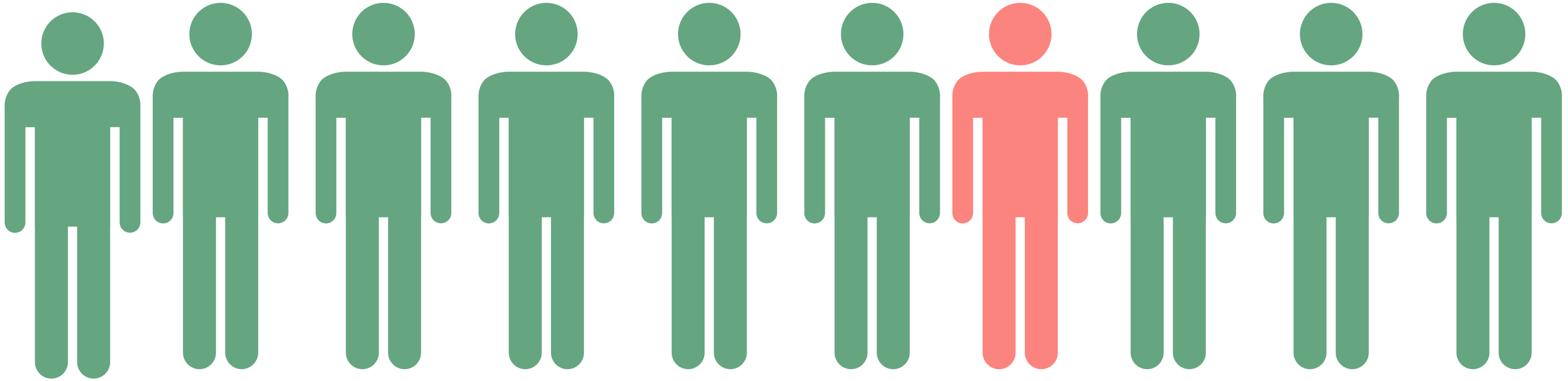
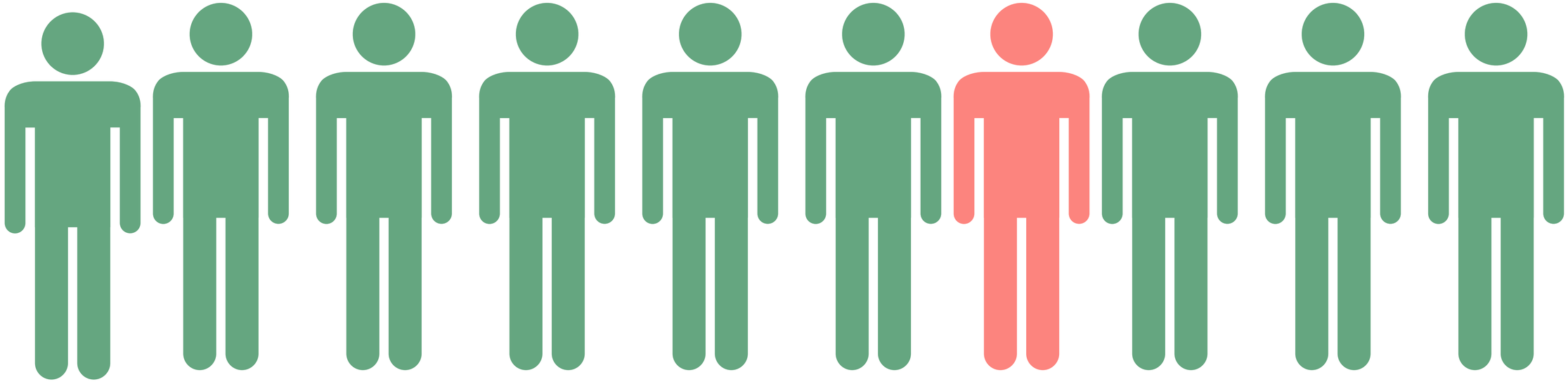
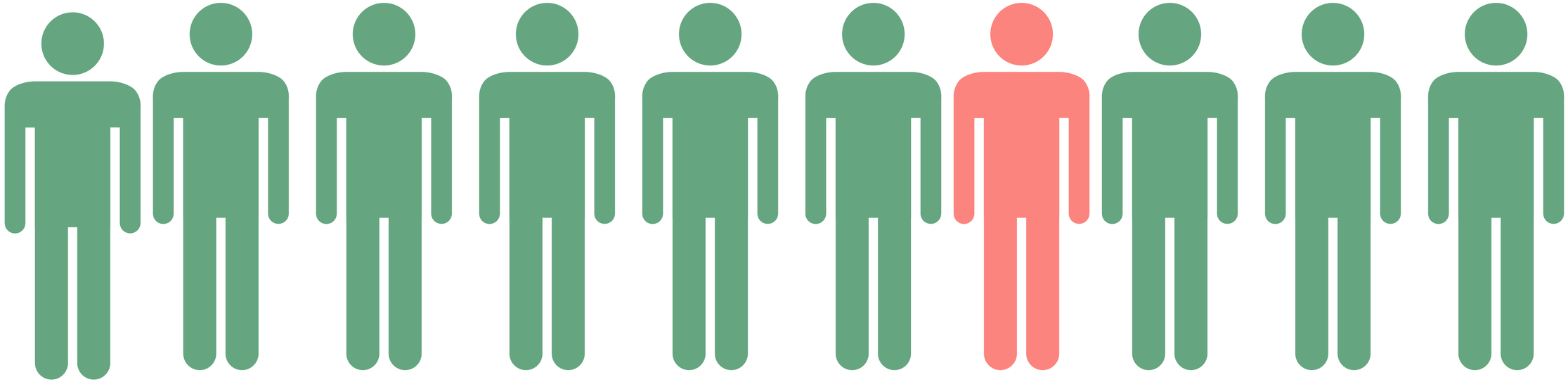


1 in 150
England
Wales



1 in 150
England
Wales

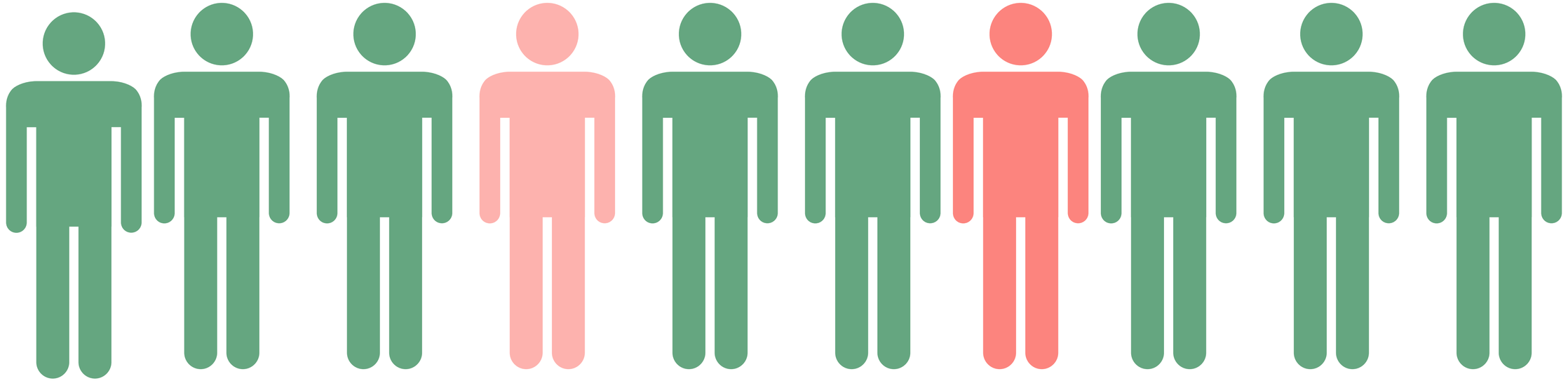
1 in 113
Scotland



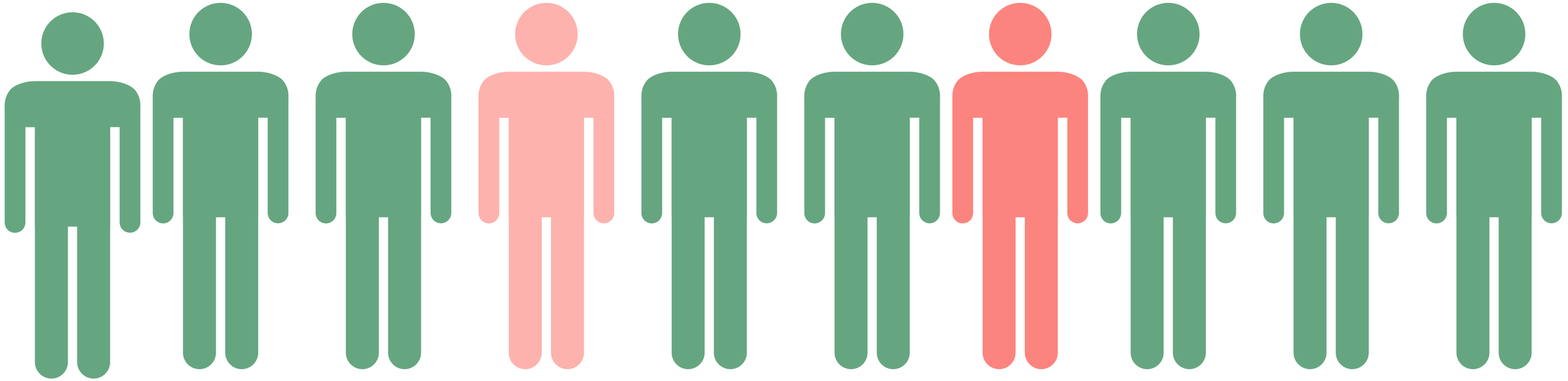
1 in 150
England
Wales

1 in 113
Scotland

1 in 10
Northern
Ireland



Under-diagnosed!



Hereditary Haemochromatosis

https://www.haemochromatosis.org.uk

Hereditary Hemochromatosis (HH1)

- **Iron overload due to increased iron absorption**
- **Iron is deposited** in the liver, pancreas, heart, joints, and pituitary gland
- **Without treatment, death may occur** from cirrhosis, primary liver cancer, diabetes, or cardiomyopathy

https://pubmed.ncbi.nlm.nih.gov/11479183/

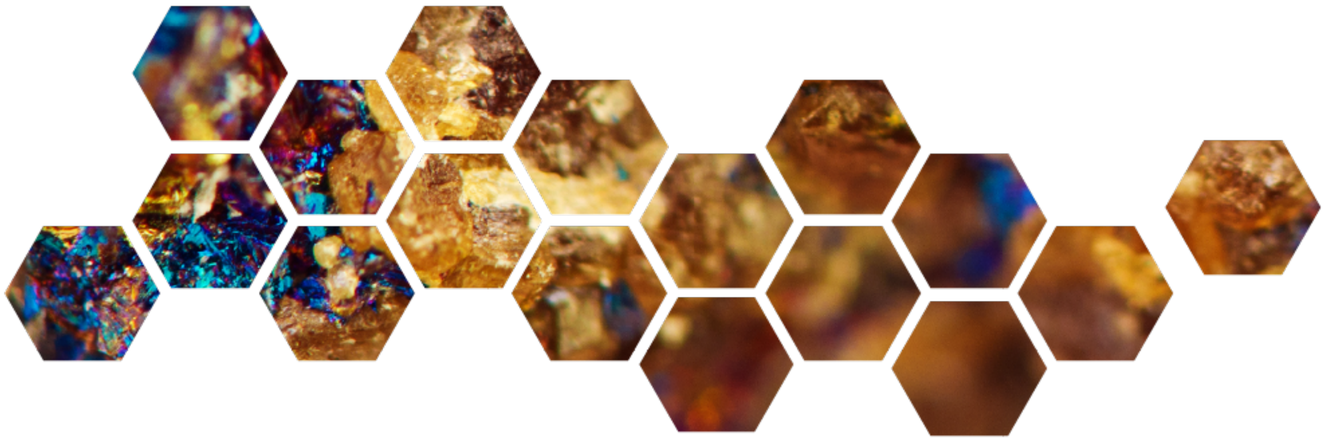
“Celtic Curse”

- **HFE gene variant C282Y** – common in Northwestern Europe (UK, Sweden, Netherlands) – Celtic/Viking origin
- Evolutionary perspective – diets were poor in iron and blood loss was frequent – higher iron stores provided **survival advantage**
- **Problematic with modern high-iron diets**

Who’s at Risk

- **Men** – more susceptible to iron overload and hereditary haemochromatosis (HH1)
- **Relevant gene – HFE**

Iron Metabolism



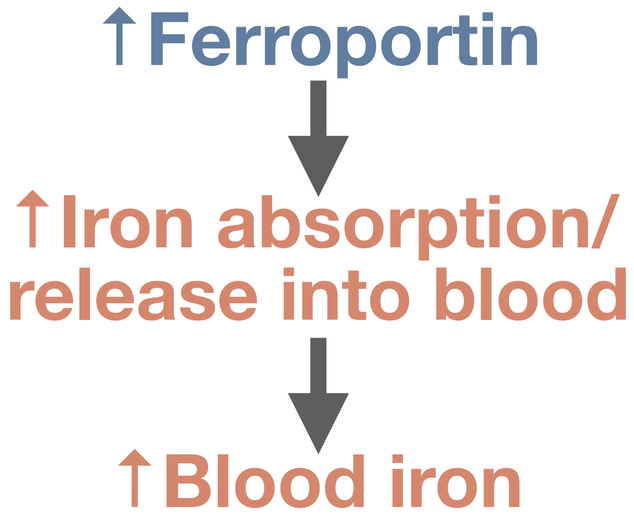
Iron can only get
into the bloodstream
if the ‘door’ is open

Door – Porta

Iron – Ferro

Door for iron – **Ferroportin**

Iron Regulation



Iron Regulation

↑Ferroportin

↓

↑Iron absorption/ release into blood

↓

↑Blood iron

Door open or closed?

↓Ferroportin

↓

↓Iron absorption/ release into blood

↓

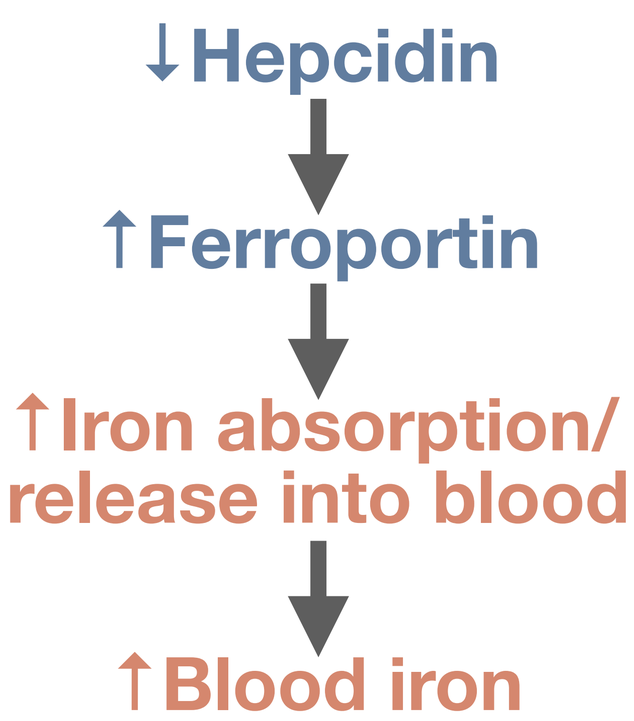
↓Blood iron


Who closes
the door?

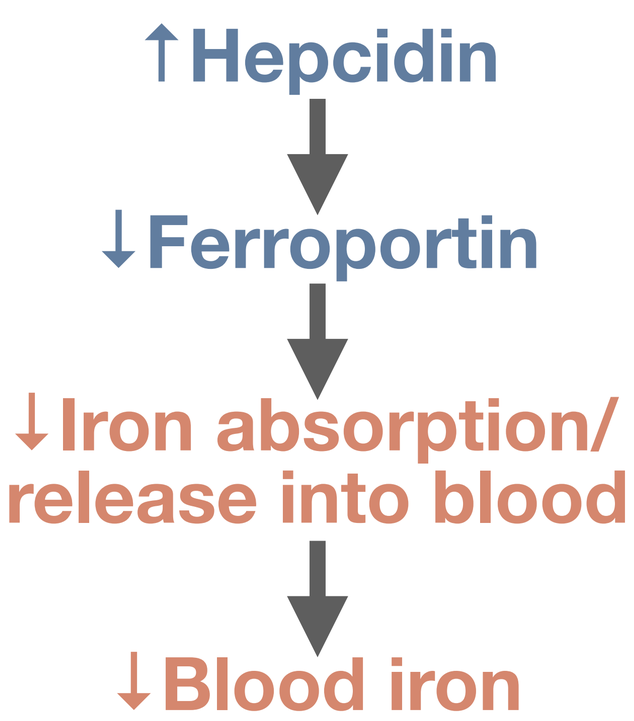
Who closes
the door?

Hepcidin
closes the door

Iron Regulation

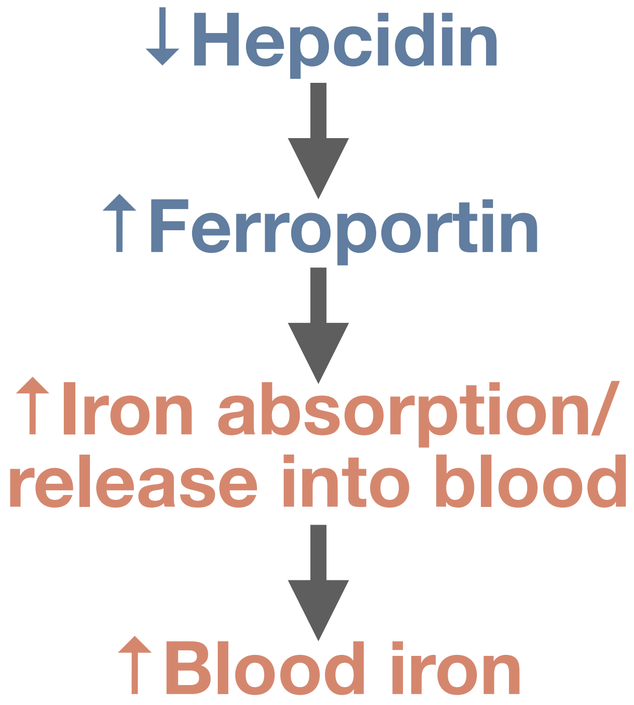


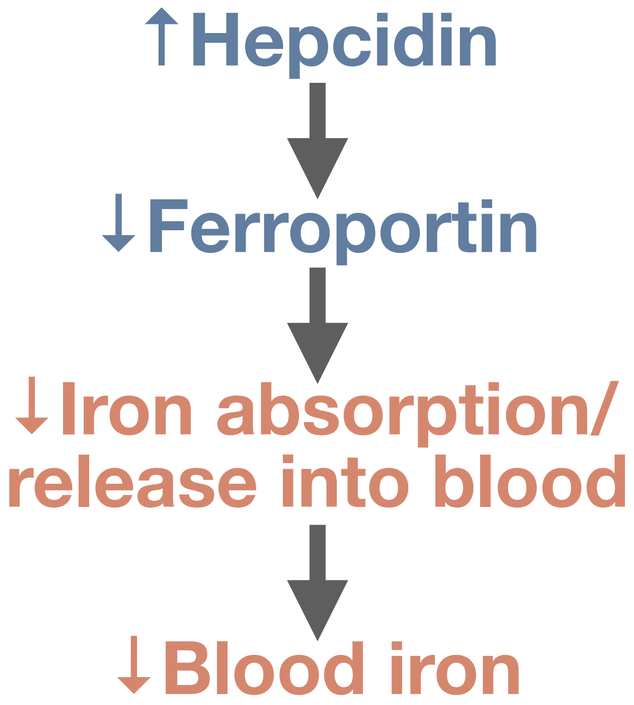
Who closes
the door?



Iron Regulation

Who decides
when to close/
open the door?





Iron Regulation

↓Blood iron

↓

MT-2 Protein

↓

↓Hepcidin

↓

↑Ferroportin

↓

↑Iron absorption/
release into blood

↓

↑Blood iron

Who decides
when to close/
open the door?

↑Hepcidin

↓

↓Ferroportin

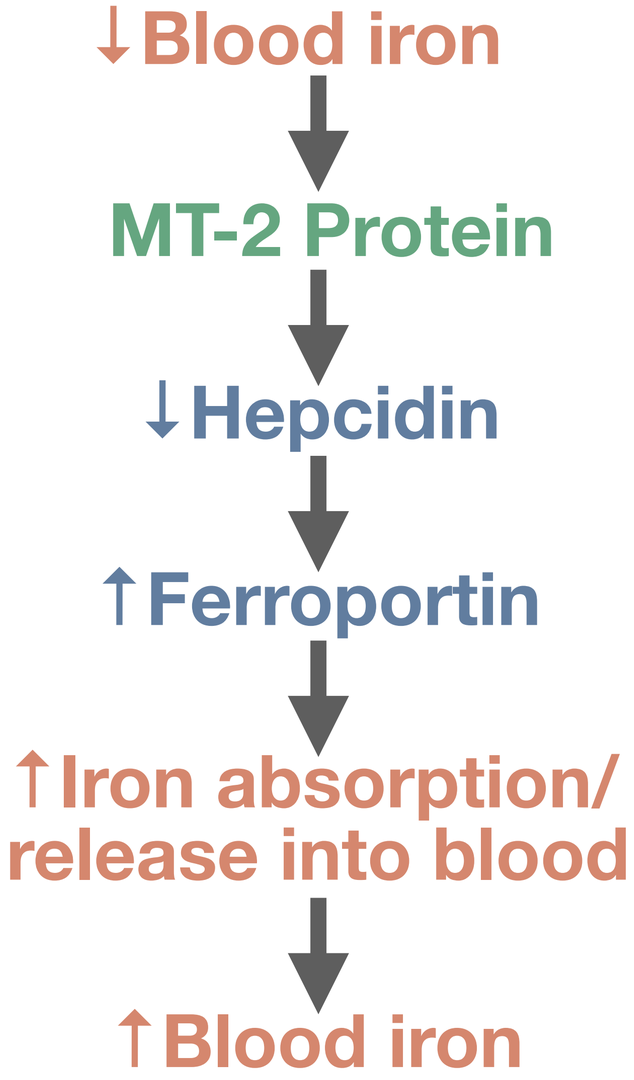
↓

↓Iron absorption/
release into blood

↓

↓Blood iron

Iron Regulation



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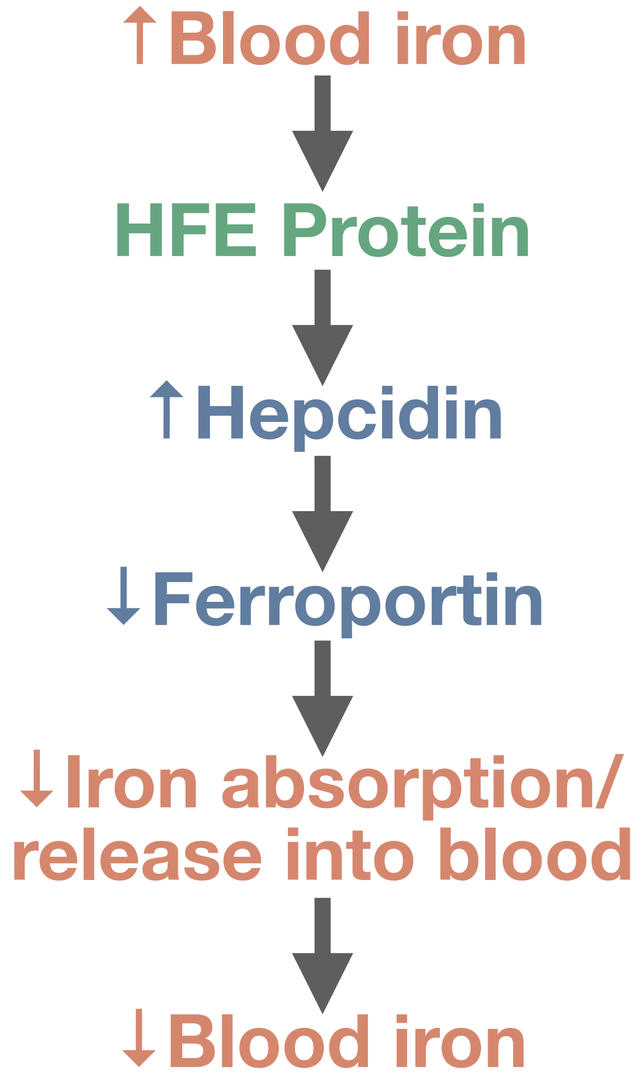
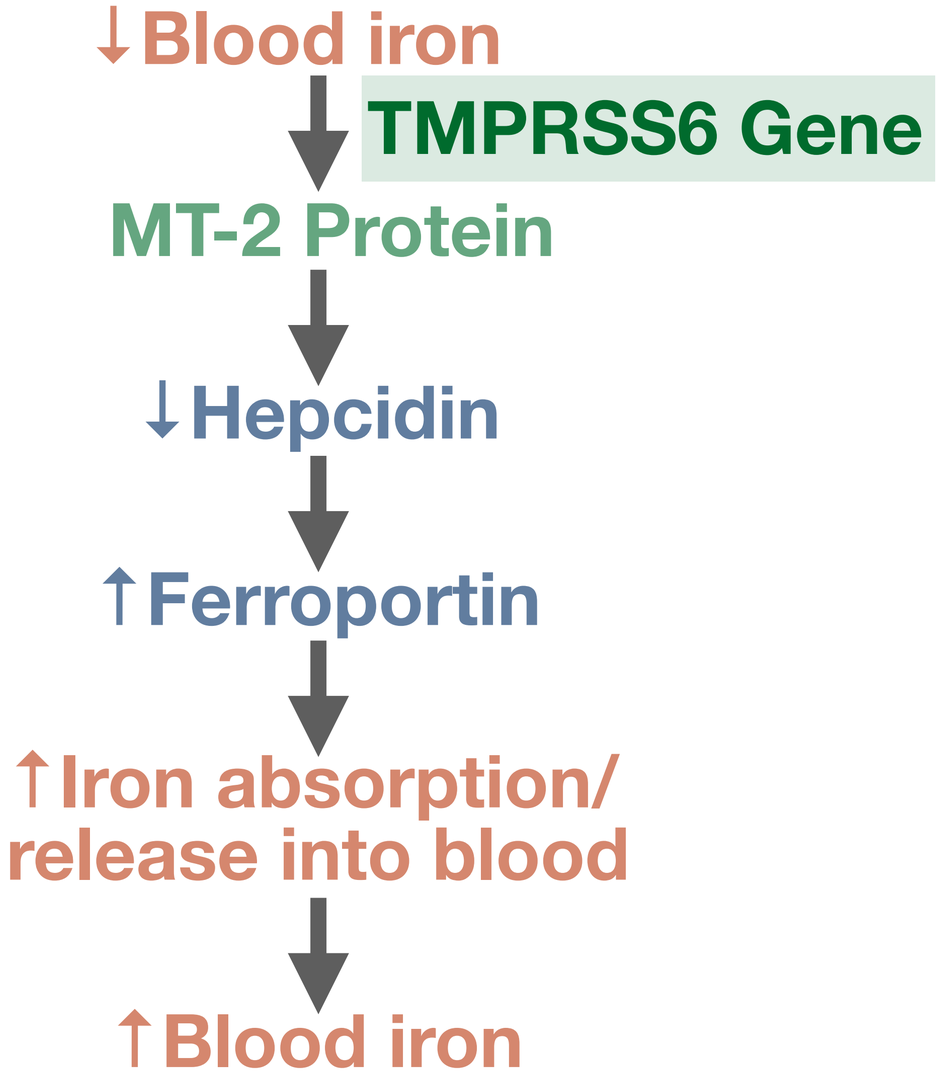
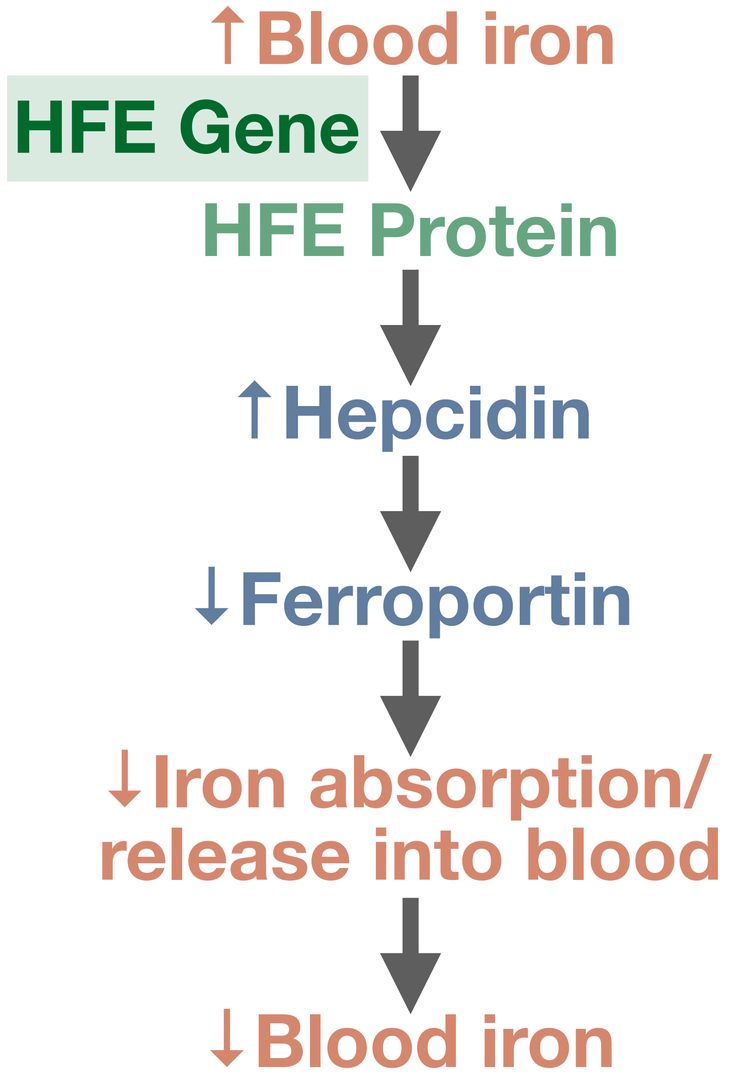
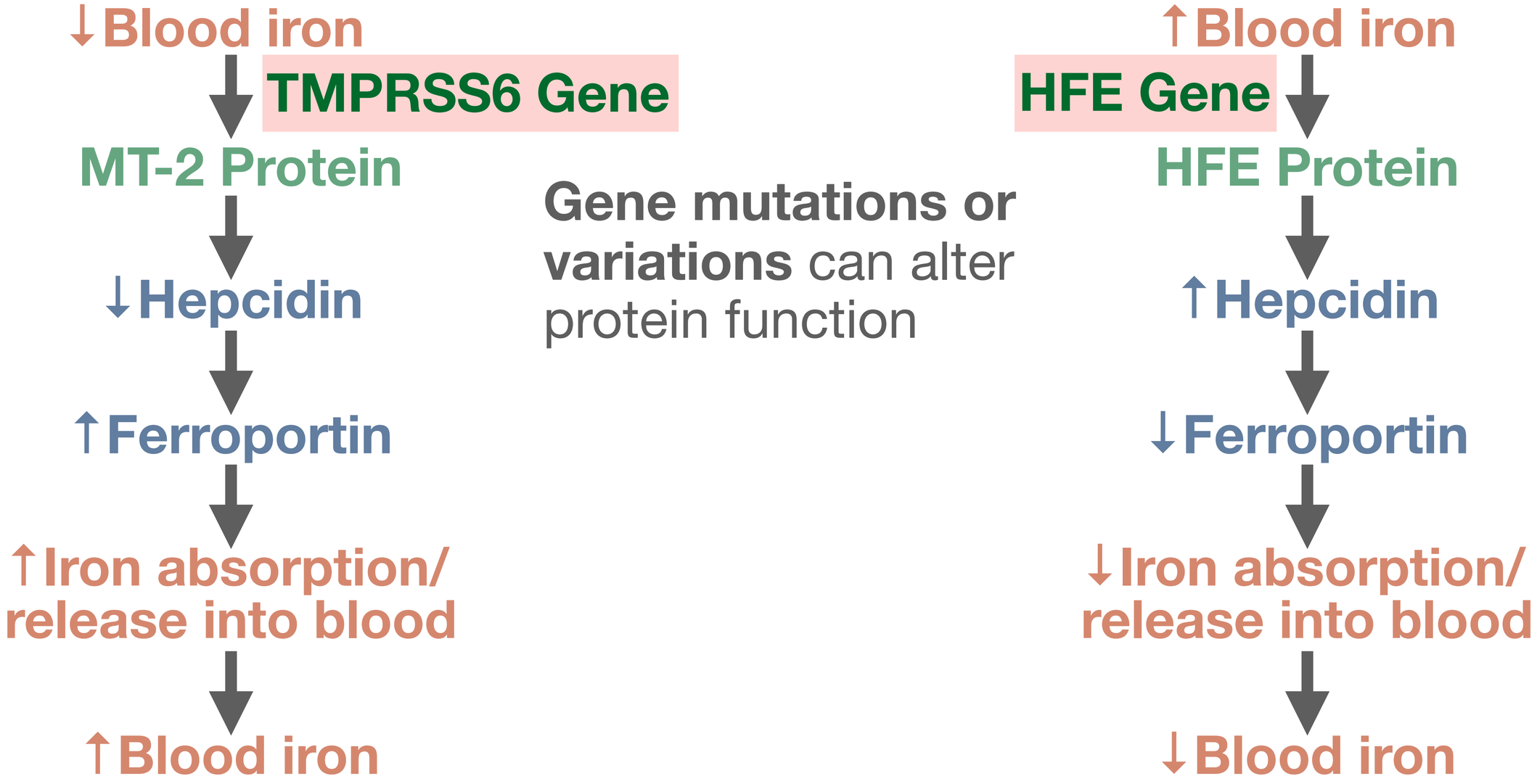


Iron Regulation



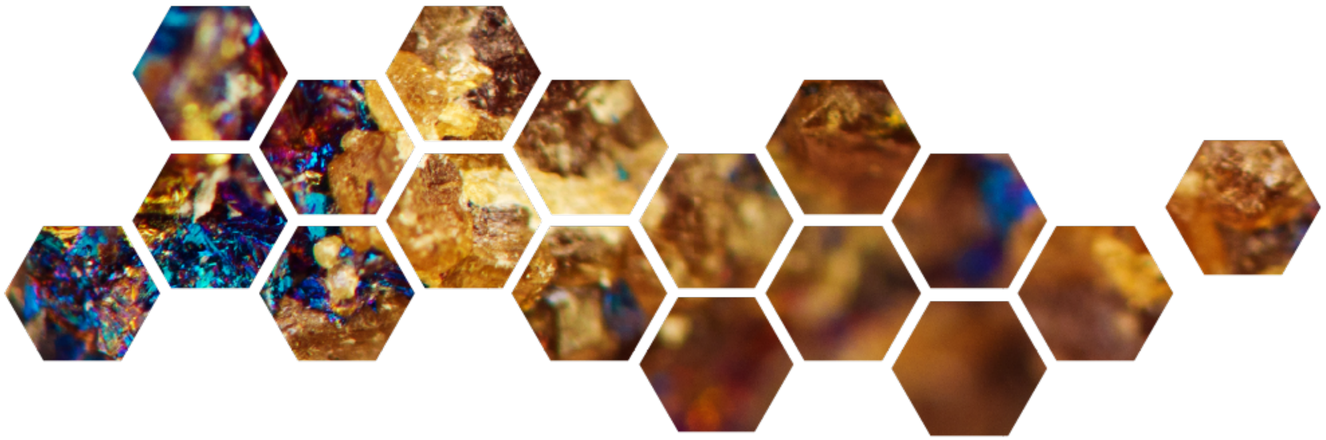


Iron Regulation



The HFE Gene

Homeostatic Iron Regulator (HFE) Protein



Your Results

HFE AA

[C282Y] Homozygous (two A alleles). Significantly increased risk of HH1. Symptoms are more likely for men and postmenopausal women.

Test blood iron levels before adopting a low iron diet. Limiting alcohol and regular blood donation can also reduce risk.

SIGNIFICANT risk of HH1

Less hepcidin, more ferroportin
Higher iron and ferritin (iron storage protein)
Iron accumulation
Organ damage


HFE gene
variant →
No hepcidin
to close the door

Iron Accumulation – Impact

- **Energy** – chronic fatigue
- **Liver** – fibrosis, cirrhosis, cancer; liver damage can lead to secondary hemochromatosis
- **Joints** – arthropathy, OA, RA, gout
- **Heart** – CVD, clotting, stroke risk, arrhythmias, cardiomyopathy, swollen ankles, shortness of breath
- **Pancreas** – IR, metabolic syndrome, T1D/ T2D, ‘bronze’ diabetes
- **Brain** – brain fog, insomnia, mental health issues, neurodegeneration, poor recovery from TBIs
- **Immune** – impaired macrophage function, inflammation, AI (AI hepatitis, thyroid, MS)
- **Gut** – dysbiosis, leaky gut, colon cancer
- **Glands** – hormonal health affected as a consequence of all the above, LH/ FSH abnormalities, menstrual issues, infertility, low libido, early menopause, erectile dysfunction, low sperm count

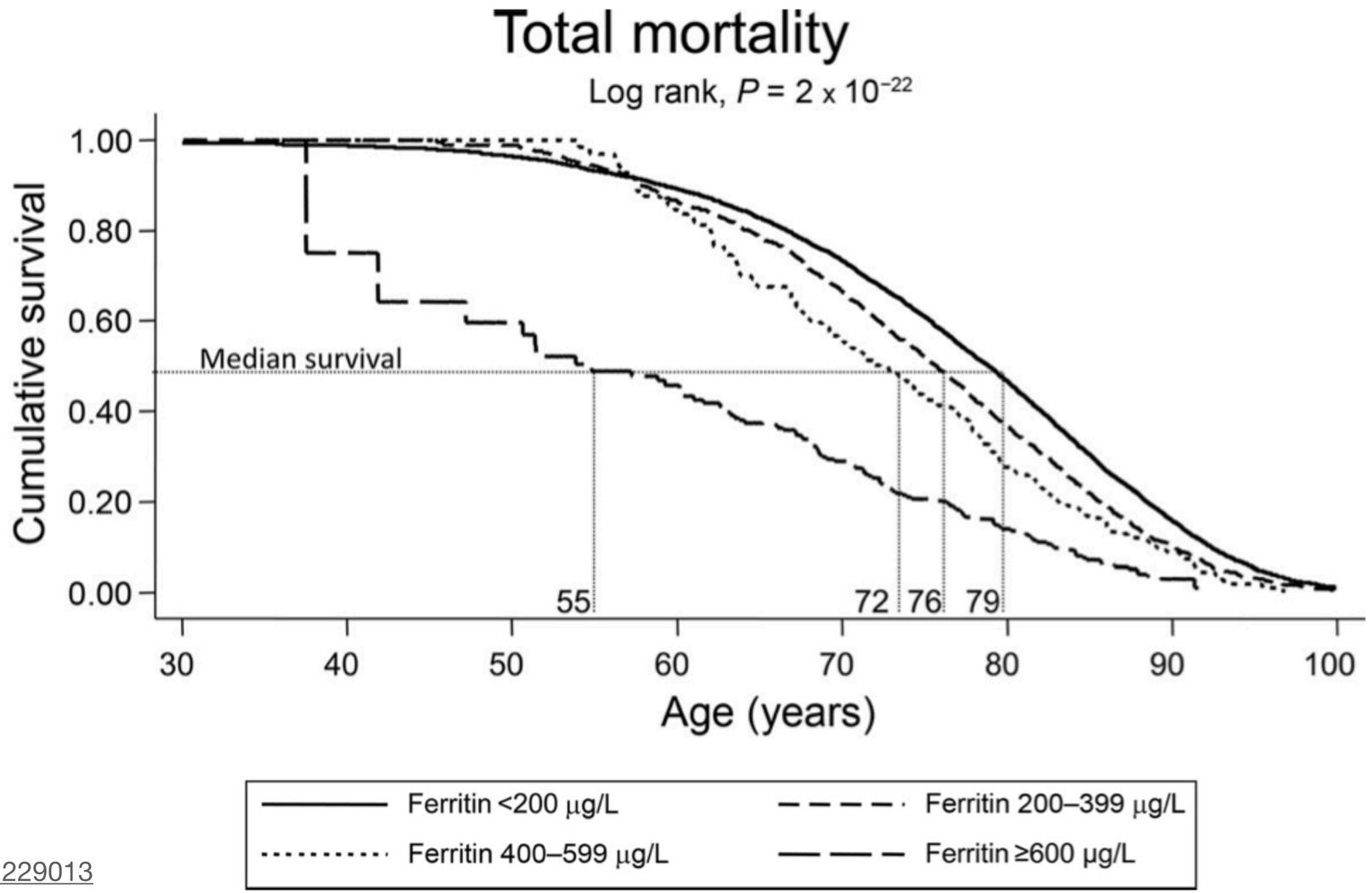
Liver Damage

- **Iron is prone to oxidation**
- **High iron –> oxidative stress –> liver damage –> less hepcidin production –> more iron absorption –> higher iron – vicious cycle!**
- **Ferroptosis** – iron-induced cell death
- **Antioxidants provide protection**

Ferritin and Longevity

Life expectancy

- 79 years at ferritin **<200**
- 76 years at ferritin 200-399
- 72 years at ferritin 400-599
- **55 years at ferritin >600**



https://www.tesble.com/10.1373/clinchem.2014.229013

Ferritin Reference Ranges

Reference Range

>15 Years Male	20-300 µg/L
15-50 Years Female (Menstruating)	10-120 µg/L
>50 Years Female	20-300 µg/L
<1 month	25-200 µg/L
1-5 Months	20-200 µg/L
6 months – 15 years	7-140 µg/L

Accurate for longevity and optimal health?

https://www.nwlpathology.nhs.uk/test/ferritin/

Ferritin Reference Ranges

Optimal ferritin for CV mortality reduction – **20-100 ng/ml**

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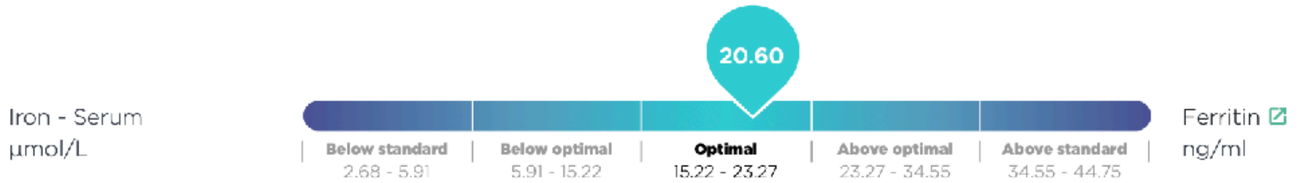
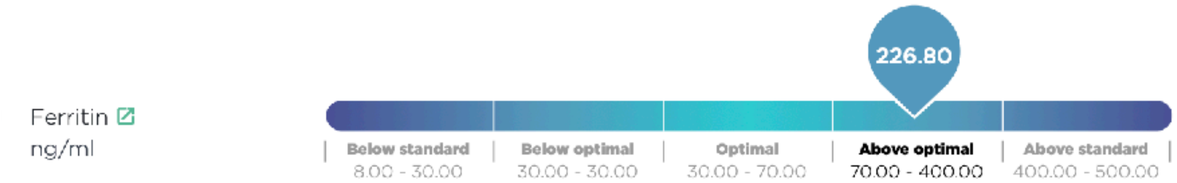
Genetics + Bloods

HFE rs1800562	AG	[C282Y] Heterozygous (one A allele). Increased risk of HH1 if also a H63D carrier (see other SNP). Although usually asymptomatic, carrier parents can pass on the risk allele to their child. Test blood iron levels before adopting a low iron diet.

IRON MARKERS

Trend over the years → → →





Support Strategies

- **Low-iron, high antioxidant diet**
- **Polyphenols** with iron-containing meals – green tea, coffee, curcumin
- **Ca, Mg, Zn** supplementation – competition for absorption
- **Limit or avoid alcohol** to preserve liver health
- **Blood donations** or therapeutic venesection

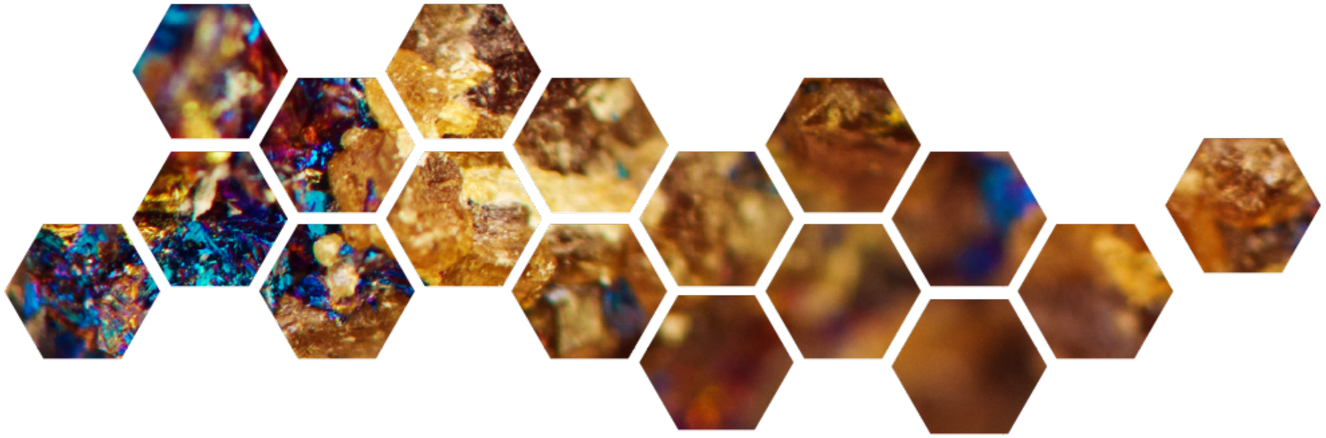
Testing

- **Genetic testing** – know if you're at risk!

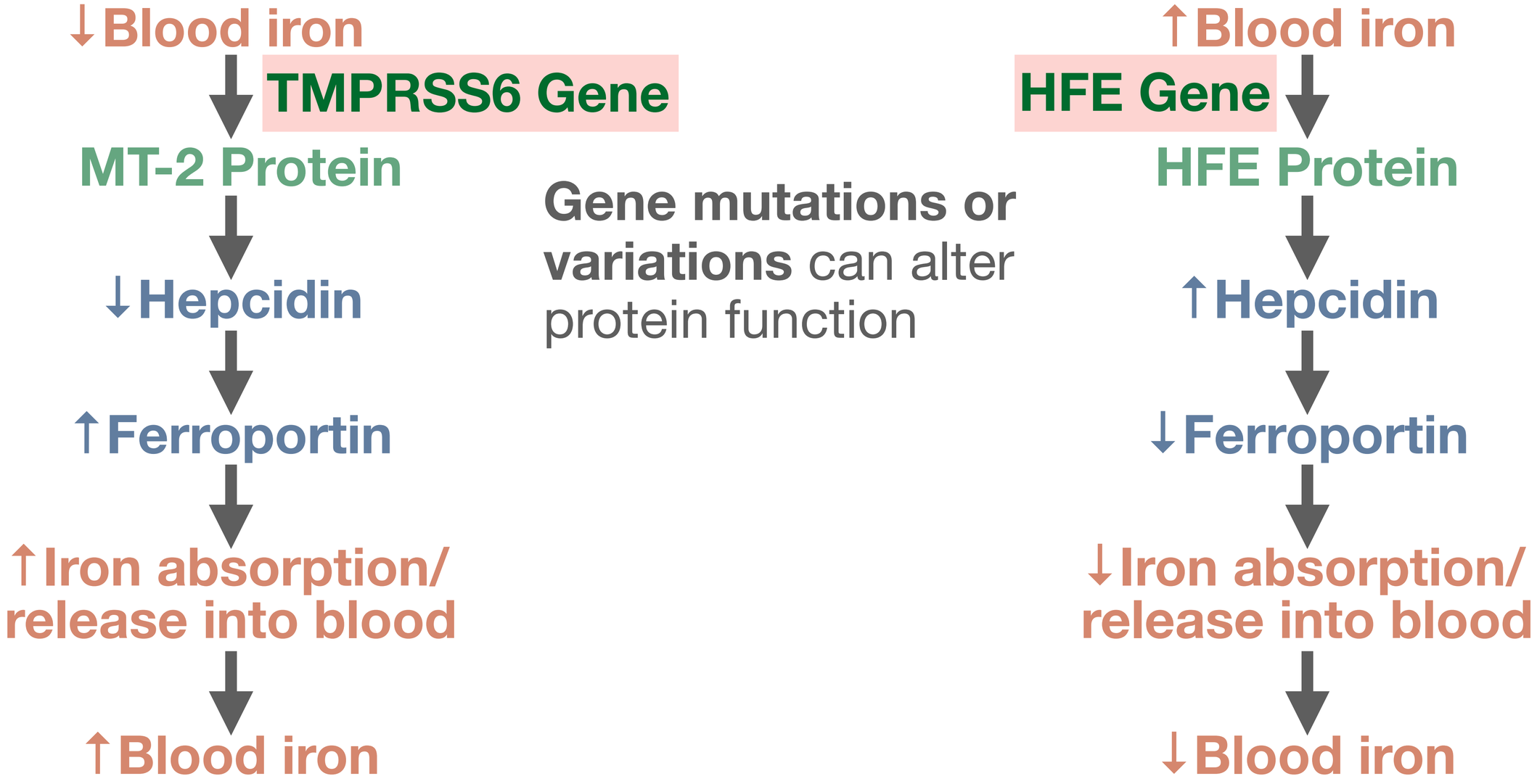
- **Regular ferritin monitoring** – watch out for levels >100 ng/ml
- **Transferrin saturation >45%** – possible early iron loading state
- Other iron markers

The TMPRSS6 Gene

Encodes the Matriptase-2 (MT2) Protein



Iron Regulation



Your Results

TMPRSS6 AA

Homozygous:
30% in Asians
20% in Europeans
1% in Africans

Lower matriptase-2 production, elevated hepcidin and inhibition of iron absorption. Risk of iron deficiency and anaemia. Increased risk of severe Iron-Refractory Iron Deficiency Anaemia (IRIDA). Review alongside HFE (genotype) results.

Iron deficiency can usually be corrected by consuming iron rich foods - particularly haem iron from animal sources, or supplementation. If IRIDA is suspected consult with a health professional.

Iron-Refractory Iron Deficiency Anaemia

Who’s at Risk

- **Men** – more susceptible to iron overload and hereditary haemochromatosis (HH1)
- **Relevant gene – HFE**

- **Women and children** – more susceptible to iron deficiency and low ferritin
- **Relevant gene – TMPRSS6**

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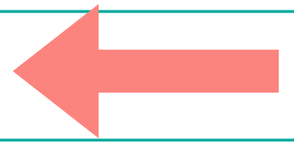


Accurate for optimal development?

Low Ferritin without Overt Anaemia

Energy and Physical Performance

- Unexplained fatigue despite normal Hb
- Reduced exercise tolerance
- Delayed recovery
- Perceived low resilience

Brain and Cognitive Function

- Iron is critical for dopamine synthesis, myelination, and mitochondrial function

Children and Adolescents

- Reduced attention and concentration
- Lower academic performance
- Slower information processing
- Increased distractibility
- Behavioural changes

Adults

- “Brain fog”
- Reduced mental clarity
- Impaired executive function
- Low motivation
- Reduced productivity

Mood and Neurotransmitter Function

- Irritability
- Low mood
- Increased anxiety
- Reduced stress tolerance

Sleep and Neuromotor

- Restless legs syndrome
- Poor sleep quality

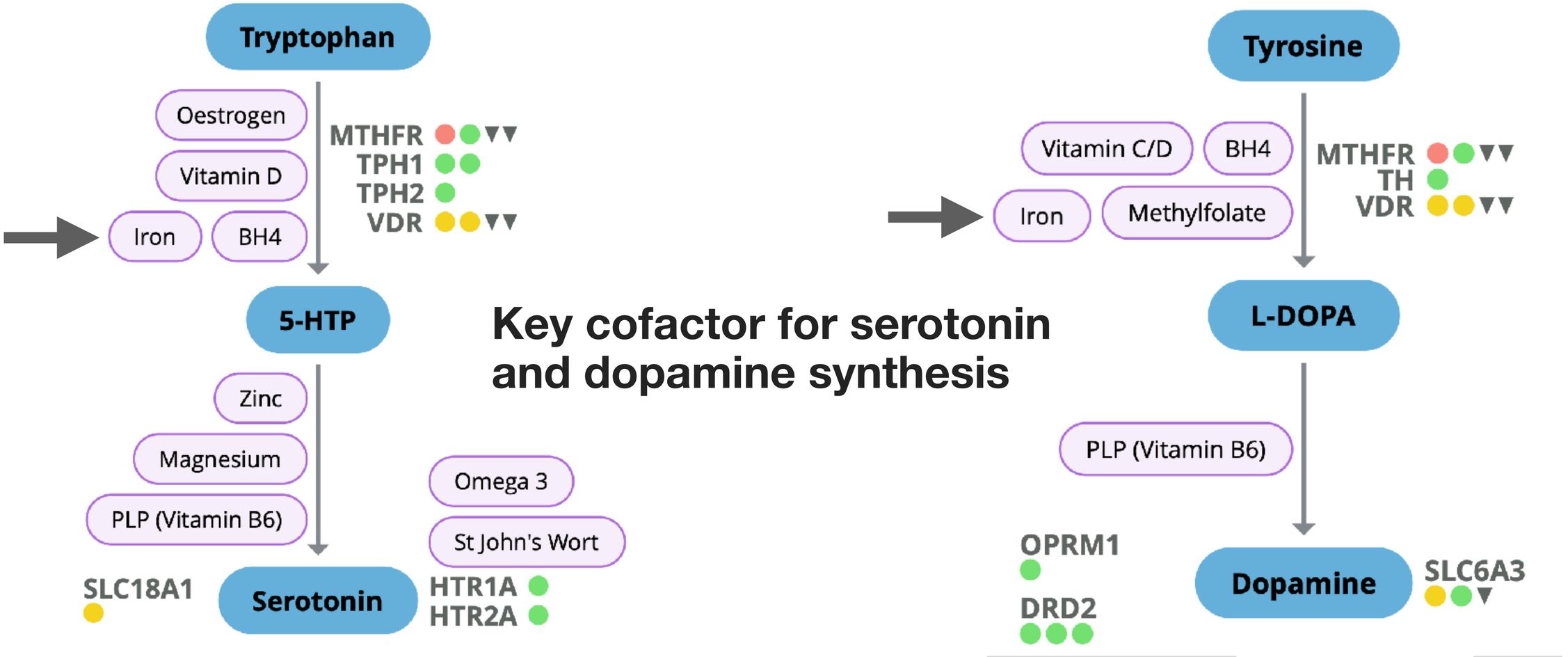
Thyroid and Metabolic Effects

- Reduced thyroid hormone synthesis efficiency
- Worsening of hypothyroid symptoms

Hair and Skin

- Diffuse hair shedding (often seen with ferritin <30–50 µg/L)
- Dry or dull skin

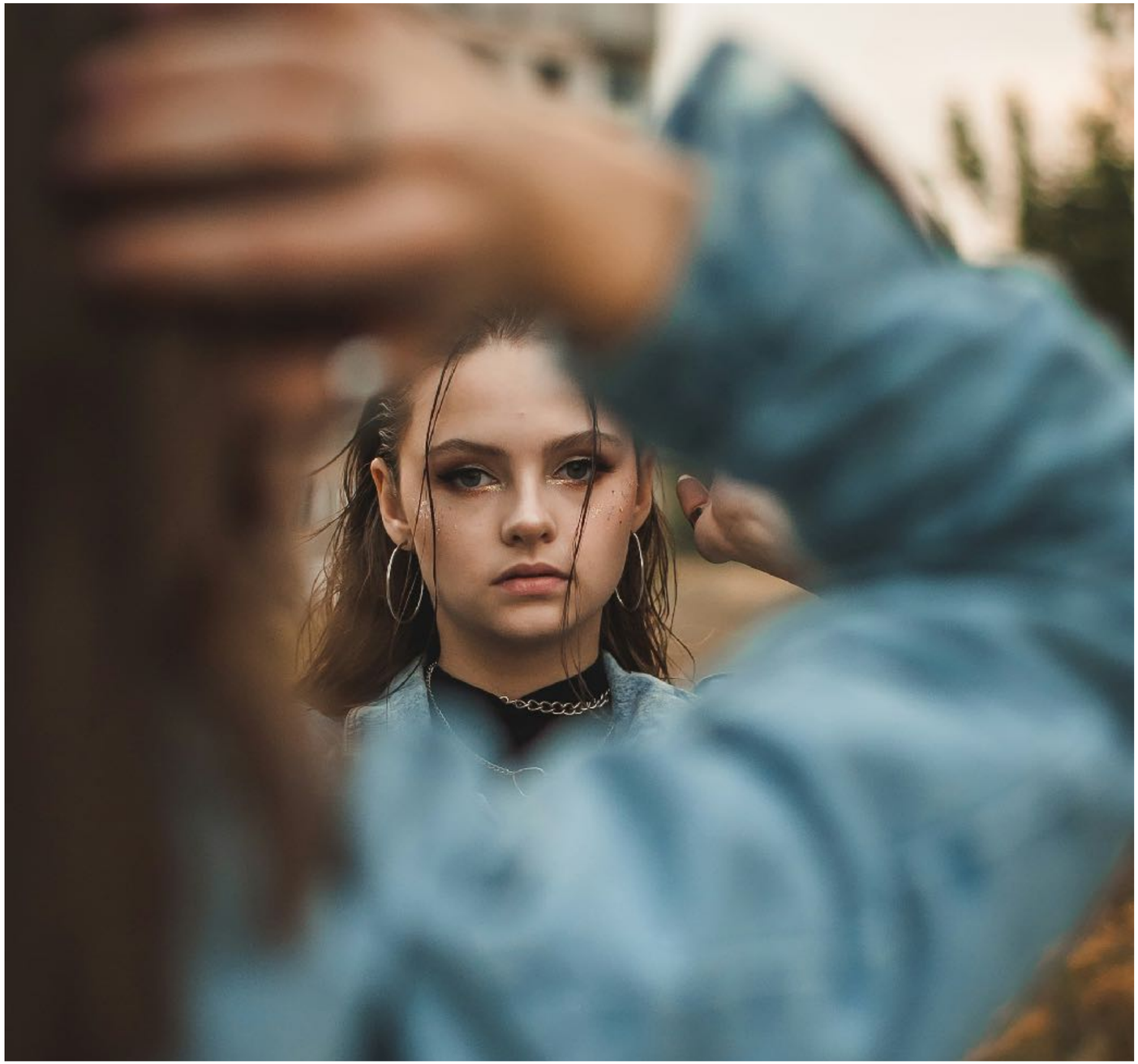
Iron and the Nervous System



Low Iron – Brain

- Developmental delay (if prolonged)
- Reduced attention span
- Behavioural dysregulation
- Learning difficulties
- Irritability
- Low mood
- Increased anxiety
- Reduced stress tolerance

Sx mimicking ADHD?



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Ferritin >30-40 ng/ml – improved attention, sleep, and ADHD Sx

Accurate for optimal development?

https://pubmed.ncbi.nlm.nih.gov/15583094/

https://pubmed.ncbi.nlm.nih.gov/18054688/

Support Strategies

- **Dietary sources of iron** (esp. heme iron)
- **Tea, coffee, and dairy** may inhibit iron absorption
- **Avoid Ca, Mg, Zn supplementation** alongside iron-rich meals
- **Address menstrual abnormalities** – menorrhagia
- **Iron infusions for IRIDA**

Testing

- **Genetic testing** – know if you're at risk!

- **Regular ferritin monitoring** – watch out for levels <30 ng/ml
- Other iron markers

Nutrigenetic testing reveals predisposition to inform proactive, preventative, personalised approach to iron imbalances

Featured Report

Iron – haemochromatosis and iron deficiency PLUS

- **Major minerals:** calcium, magnesium, phosphorus, potassium and sodium
- **Trace minerals:** copper, manganese, selenium and zinc
- **Heavy metals (toxic elements):** arsenic, cadmium, lead, and mercury

Beyond Testing

- **NPP – Our flagship Nutrigenomics Practitioner Programme** (next January – March 2027) – ten weekly two-hour sessions for health professionals
- **On-demand Courses** – Methylation Master and Hormones Master
- **Free Snapshots** – over 60 hours of free video content

Lifecode GX ®

— Professional Genotype Analysis —

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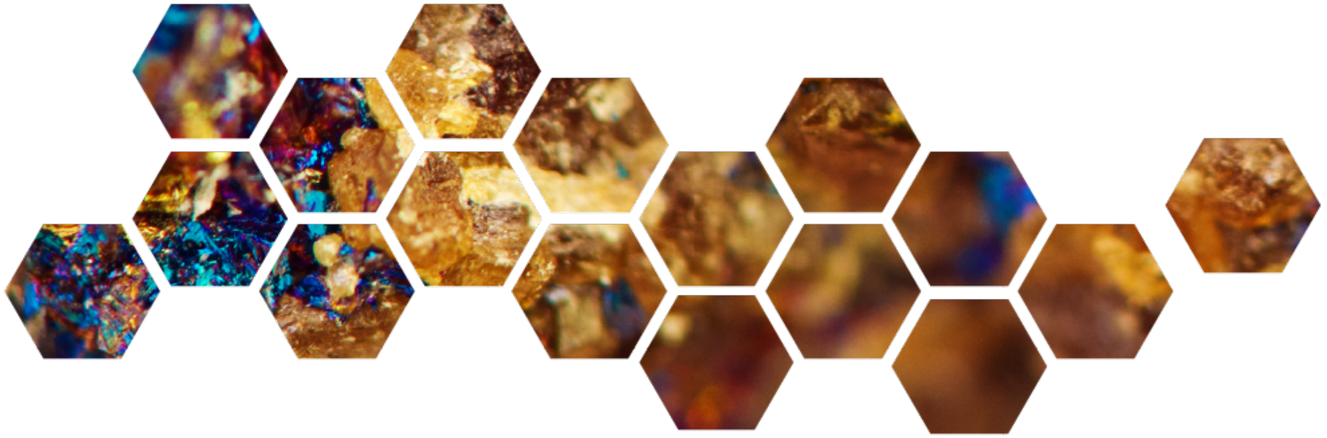

Image credits

S8 – Happy family in the sunshine – Photo by Dmitry Rodionov on Unsplash

S9 – Viking – Photo by shahin khalaji on Unsplash

S11 – Open door – Photo by Jan Tinneberg on Unsplash

S12 – Handle on the door – https://www.istockphoto.com/photo/hand-opening-rustic-wooden-door-with-golden-handle-gm2248187866-662053648

S27 – Photo by George Bakos on Unsplash

S32 – Tea (or coffee) – Photo by Clay Banks on Unsplash

S37 – Teenage Anxiety – Photo by Kateryna Hliznitsova on Unsplash

S41 – Meatballs – Photo by Jason Leung on Unsplash

S43 – Little girl under umbrella – https://unsplash.com/photos/a-little-girl-holding-an-umbrella-in-the-rain-e-i4-kQ7i10?